Auditory Presentation of H/OZ Critical Flight Data, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

Automation of a flight control system to perform functions normally attributed to humans is often not robust and limited to specific operating conditions and types of operation and a small set of fixed behaviors (i.e. modes). eSky has shown that metrics such as the time delay between a required control input from the crew and the actual input is sensitive to crew functional degradation through external distraction. We are currently developing strategies for using such crew state metrics to modulate the level of automation support provided to the flight crew. Dynamic reallocation of function between crew and automation can reduce the cognitive workload on the crew, enhance their ability to supervise the automation and help them intervene in the event of any failure or operation outside the desired operating conditions. eSky is exploring function reallocation in a collaborative flight control system (HFCS) design pioneered at NASA Langley. HFCS combines precise flight control automation with rudimentary intelligence that the flight crew can guide using relatively simple mechanisms. HFCS automation manages short-term control tasks (e.g. path following) while the crew is required to direct every significant trajectory change using flight controls rather than an FMS interface to keep them engaged in conduct of the flight. The automation communicates intentions to the pilot through visual and haptic (tactile) feedback; the crew communicates intentions to the automation through conventional controls. The HFCS user interface is primarily visual and tactile with limited auditory elements, mainly limited to a few alerts and warnings. eSky proposes to establish the auditory channel as a key element in providing flight dynamic information and cueing of required crew in puts in addition to envelope protection warnings. These new interface elements will be integrated into eSky's evolving strategies for functionality reallocation of between automation and crew.

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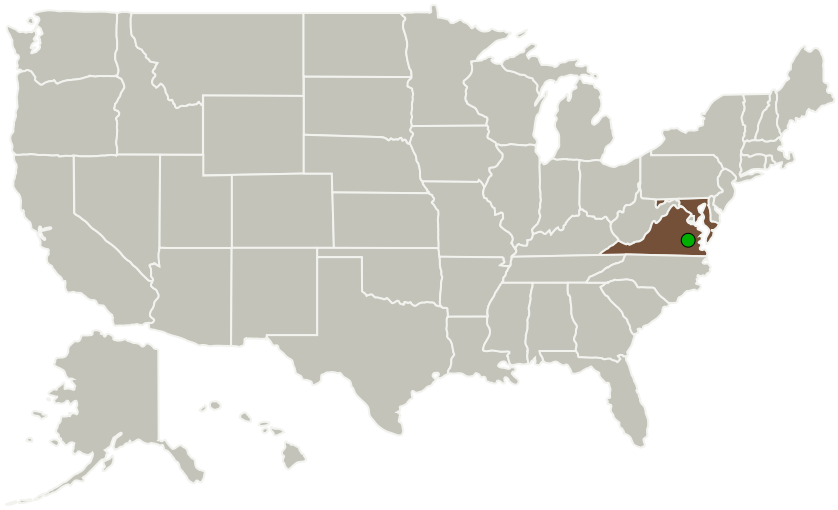
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Emerald Sky Technologies, LLC	Lead Organization	Industry	Columbia, Maryland
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138010)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Emerald Sky Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

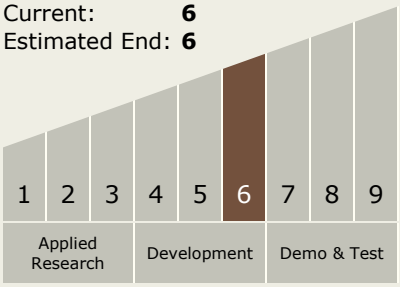
Carlos Torrez

Principal Investigator:

Steven L Fritz

Technology Maturity (TRL)

Start: **6**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.3 Informatics and Decision Support Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System